BOOK REVIEWS.

THE FAMILIES OF DICOTYLEDONS. By A. Gundersen. xviii+238, numerous line-drawings. Waltham, Mass.: Chronica Botanica Co. London, W.C.2: Wm. Dawson and Sons, Ltd. 1951. $4·75.

This compact book reflects the recent great growth of interest in the morphology and relationships of the Flowering Plants. It makes no startling changes in existing systems, but suggests numerous cross-connexions between families and points out lines of research work which may lead to a better understanding of the endlessly complicated systematic meshwork of the Dicotyledons. There are short introductory chapters (of very unequal value) by other authors on the various lines of work which converge on the main evolutionary problem—anatomy, fossil history, cytology, plant geography, etc.—but the main part of the work consists of condensed summaries of the 240 families distinguished by the author. This number is rather less than that of Hutchinson (264) but is much greater than those of Bentham and Hooker and Engler (200); largely because of recently described and discriminated families from the Far East and Pacific areas, whose validity can only be tested by further exploration and study. This variation in outlook as to number and scope of families compels a negative answer to the author who, for practical convenience "wonders whether the time is ripe or not for an attempt to prepare a widely acceptable standardized list of the families of dicotyledons (and other groups)".

Gundersen's account of each family is very brief but it contains the salient morphological features together with a valuable collection of references to recent studies, including chromosome numbers, anatomy, etc., bearing on the family's relationships; abbreviations being used freely. The majority of the families are illustrated by bold drawings of floral structure, often including developmental stages, contributed by Miss M. A. Purdy, and these form a most instructive part of the book, though the question of scale is often not at all clear.

As a teaching manual, as a supplement to other synopses of the dicotyledonous families, and as suggesting further investigations, this book will be welcome. The author, who was for 32 years on the staff of the Brooklyn Botanic Garden, at first in the herbarium, later as Curator of Plants, is to be congratulated on a very useful and thought-provoking addition to the systematics of the Flowering Plants.

R. H. COMPTON.

MANUAL OF PHYCOLOGY. Edited by Gilbert M. Smith. Chronica Botanica Co., Waltham, Mass., U.S.A. London, W.C.2: Wm. Dawson and Sons, Ltd. 1950. $7·50.

This volume is a most welcome addition to Phycological literature. In less than 400 pages the book covers a much more extensive field than is covered by most books on algae. Each chapter is written by an authority on that aspect of the subject. The only serious omission relates to the economic aspect but it is hoped that an entire volume will be published later dealing with this. Even with this omission it is inevitable that the available space will not allow full justice for all the numerous topics considered. Parts of the book certainly have the character of skeleton outlines and guides to the literature; more detail would often be welcome. The limited size of the volume may also account for the somewhat inadequate illustrations.

In order to avoid further delay in publication references subsequent to 1948 are not included.

Following an historical introduction (Prescott), there is an interesting and valuable discussion on classification (Smith). This chapter deals with the inclusion of flagellate forms among the algae and the consequent increase in the number of recognized algal groups; the taxonomic status of the groups delimited is also considered. The seven chapters which follow deal with the various algal groups and as this occupies less than half of the volume it is not surprising that certain sections are very condensed. This is evident in the chapter on Chlorophyta (Iyengar) which contains, however, a less condensed and an instructive summary of the types of life history occurring among the green algae.

The taxonomic approach outlined in the second chapter is amplified and applied in the subsequent accounts of the major algal groups. This is seen in the comments on differences in nutritional status of members of the Euglenophyta (Jahn), Chrysophyta (Fritsch) and Pyrrophyta (Graham) and in the descriptions of transitions from flagellate to algal organization seen in the predominantly flagellate groups. The chapters dealing with the Divisions of Algae also contain comments relating to the taxonomic subdivision of the major groups. Thus Papenfuss in the chapter on Phaeophyta discusses the morphologically dissimilar generations of *Cutleria* in relation to the subdivision of the brown algae into Isogeneratae, Heterogeneratae and Cyclosporeae. He also calls attention to the uncertainty regarding the systematic position of the plants included in the Chordariales due to our limited knowledge of the order.

The remaining part of the book deals with a considerable range of subjects: fossil algae (Johnson); cytology (Bold); sexuality of algae (Smith); the pigments of algae (Strain); physiology and bio-chemistry

(Blinks); ecology of fresh water (Tiffany) and of marine (Feldmann) algae; and marine phytoplankton (Ketchum). The book ends with two useful appendixes; one on methods of cultivating algae (Pringsheim) and the second on microtechnique (Johansen). In these chapters the considerable gaps in our knowledge are repeatedly pointed out. This is true also of the earlier chapters but to a lesser extent. The need of more extended research is especially brought out in the chapter on cytology and in that on physiology and biochemistry and Blinks dealing with the latter subject concludes with the statement that: "If the present sketch has served to suggest any possible researches, it will have served a useful purpose" (p. 283). We may add that if it does not do so no blame can be laid at the door of the writer. The need for many further researches is also made clear by Feldmann, especially in the concluding section of his chapter on the ecology of marine algae.

It is somewhat invidious to single out any of these chapters for special mention. Attention, however, may be called to Feldmann's lucid and illuminating chapter on the ecology of marine algae, although the section on the marine vegetation of different parts of the world, at least partly due to considerable condensation, is not as satisfactory as the rest of the chapter. On p. 323, *Porphyra* is described as a hypnophycean passing the unfavourable season as a protonema. It may be remarked that the *Porphyra capensis* association on the West Coast of South Africa persists throughout the year.

It is a pity that Ketchum in his chapter on plankton algae limited his account to the factors determining growth and photosynthesis. A treatment of other themes would have been welcome such as a general account of annual plankton cycles and of such special relationships as have been worked out between irregularities in herring migrations and the distribution of *Phaeocystis* and diatom species and between phosphate values, phytoplankton and whale distribution.

The text contains a number of printer's errors: "severed" for "served" on p. 8, "place" for "placed" on p. 14, "(Fig. 38G)" for "(Fig. 39G)" on p. 176, "chrondriosomes" for "chondriosomes" on p. 203. In chapters 14 and 16 there is also some lack of agreement between the dates of literature citations in the text and in the corresponding bibliography. It is incorrect to state (p. 17) that the unilocular reproductive organs of Phaeophyta always contain more than one reproductive body.

In spite of various shortcomings the Manual of Phycology is a valuable addition to the books on algae for advanced students and research workers and should prove a stimulus to further research on many problems of phycology.

WM. EDWYN ISAAC.

TRACE ELEMENTS IN PLANT PHYSIOLOGY. *Lotsya*, Vol. 3—I.U.B.S. Colloquia, Series B, No. 1. Waltham, Mass. The Chronica Botanica Co. London, W.C.2: William Dawson & Sons, Ltd. 1950. $4·50.

This publication is a report of the proceedings of a Symposium on trace elements held at Rothamsted in November, 1947. The Symposium was organized by the International Union of Biological Sciences and supported by Unesco. The report contains contributions by workers from Britain (Wallace, Hewitt), Czecho-Slovakia (Nēmec), Denmark (Steenbjerg), Finland (Erkama, Jamalainen), France (Lavollay), Netherlands (Mulder, Löhnis, Seekles), Sweden (Burström), Switzerland (Gisiger), and U.S.A. (Arnon). The contributions are in English save that of Lavollay. At the end of most contributions points arising from the discussion which followed are recorded.

As indicated in the Preface, the background of the Symposium was the intensified wartime realization of the importance of trace elements in agriculture and horticulture. Consequently taken as a whole, the main emphasis is on practical problems. While this emphasis is evident throughout, it is paramount in the contributions on zinc deficiency of fruit trees in Europe (Mulder), micro-elements from a practical point of view (Steenbjerg), the role of trace elements in the agriculture of Finland (Jamalainen), and in Wallace's contribution on the application of visual methods in the diagnosis of trace element deficiencies and excesses in plants.

Theoretical considerations, however, are not neglected and the functions of trace elements in plant metabolism are discussed by Burström, Erkama, Lavollay and Mulder. Burström deals with the action of nitrogen, iron and manganese on roots; Erkama with the effect of copper and manganese on the iron status of higher plants; Lavollay with the quantitative interactions of nutrients in *Aspergillus niger*; Mulder with copper and molybdenum in the nutrition of micro-organisms and higher plants.

The Symposium ends with a contribution by Seekles on the "Mode of Action and Occurrence of Trace Elements in Pastures and in the Blood and Liver of Farm Animals". This contribution serves to indicate the linking up of plant nutrition with problems of animal and human nutrition.

A detailed survey of the field of micro-nutrients, even from an empirical point of view, will not be found in this publication, but the contributions and points arising from discussions should stimulate further research and thought on a number of topics.

WM. EDWYN ISAAC.

MYCOTROPHY IN PLANTS: LECTURES ON THE BIOLOGY OF MYCORRHIZAE AND RELATED STRUCTURES. By Arthur P. Kelley. Waltham, Mass. The Chronica Botanica Co. London, W.C.2: Wm. Dawson and Sons, Ltd. 1950. $5·00.

This volume is presented as a general introduction to the problems of mycorrhizal relationships between fungi and the higher plants. It is difficult to see why the 12 chapters should have been termed "Lectures", as they consist essentially of a series of short abstracts of the published work on various aspects of the biology of mycotrophic plants, with very little critical comment. This makes the work a useful reference-book for workers in the field of mycorrhizal relationships but limits its value as an introduction to the subject for the non-specialist.

Topics dealt with are the history of mycotrophic studies, the occurrence of mycorrhizae, the distribution of mycotrophic plants and their environment, the structure of mycorrhizae, the question of whether the relationship is an obligate one, the phenomenon of mycotrophic phagocytosis and theories of the nature of the relationship.

The author rightly emphasizes the necessity of more taxonomic and morphological work, and of further exploration of the plant kingdom to determine the extent of the phenomenon, in view of its possible importance in connexion with the problem of the absorption of nutrients by roots.

The text contains a number of misprints, and a misplaced footnote. The bibliography is extensive.

L. OLIVIER.

MANUAL OF BACTERIAL PLANT PATHOGENS. By Charlotte Elliott. Second revised edition. Waltham, Mass. The Chronica Botanica Co. London, W.C.2: Wm. Dawson and Sons, Ltd. 1951. $6·00.

This work, which is Volume 10 of the Chronica Botanica Company's Annales Cryptogamici et Phytopathologici, is one strongly to be recommended to any worker in the field of agricultural bacteriology or plant pathology.

It consists of a list, alphabetically arranged, of all the known bacterial plant pathogens, with their sources and synonymy, morphological features, staining reactions, physiological characteristics and behaviour in culture. A list of the host plants reported for each pathogen is given, and the disease symptoms produced are described in detail. The geographical distribution of each organism is indicated, and control measures are given. The literature citations for each organism are arranged in chronological order. Nomenclature is based on the 1948 edition of Bergey's Manual of Determinative Bacteriology, and the author's preface gives a brief and lucid explanation of the reasons for the transference of certain groups from Phytomonas to Pseudomonas and to Corynebacterium, and of the characteristics of the two new genera, Xanthomonas and Agrobacterium. There are two indices, one of genera and species of bacteria, the other of plant hosts.

L. OLIVIER.

NATIVE ORCHIDS OF NORTH AMERICA. By Donovan S. Correll. Pp. xvi and 399, including Frontispiece (2), plus 146 plates and 7 text figures of line drawings. Waltham, Mass., U.S.A. The Chronica Botanica Co. London, W.C.2: Wm. Dawson and Sons, Ltd. 1950. $7·50.

This book, by Dr. Donovan S. Correll, is an important contribution to orchidology. It brings together for the first time an account of all North American orchids (which have so far been recorded) from north of Mexico to beyond the Arctic tree-line—a vast area, with extremely diverse conditions in regard to geology, topography and climate, with the result that the orchid flora dealt with ranges from the modest bog-loving terrestrial in the north, to the epiphytes in the southern, sub-tropical parts.

A total of 46 genera, comprising something like 169 species (including one or two varieties and natural hybrids) are dealt with. The author supplies a key to the genera, and the arrangement of the genera in the book follows Rudolph Schlechter's system.

Besides full descriptions of each species, the author furnishes extensive notes, including synonyms, meaning of the scientific names, common names, flowering times, type locality and geographical distribution.

A feature is the cultural requirements, where known, of each species—with much valuable data supplied in this respect by Prof. Wherry and Mr. John V. Watkins.

Finally the beautiful and accurate line drawings, supplied by Mrs. Blanche Ames Ames and Mr. Gordon W. Dillon, complete a book of much value to the botanist, horticulturist and orchid lover.

H. F. WERNER.